San Diego County

BUILDING

BETTER ROADS

Working Group Meeting

02/09/2021

AGENDA

1) Orientation / Sign-In

2) Public Comments

3) Welcome / Opening Statement

4) Working Group Updates

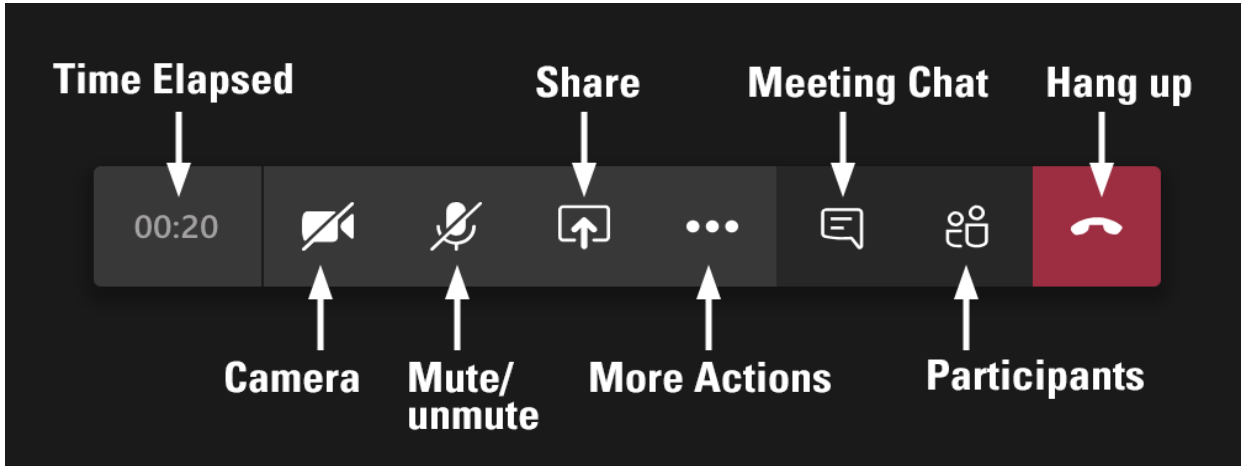
5) Industry/Organization Updates

6) Key Presentation / Round Table Discussion

7) Next Working Group Meeting / Close

Teams Meeting Etiquette / Sign-In

- Mute Microphone unless presenting
- Turn Camera off unless presenting
- Use Chat window for questions
- Please enter your Name, Company/Agency, E-mail in Chat



AGENDA

1) Orientation / Sign-In

2) Public Comments

3) Welcome / Opening Statement

4) Working Group Updates

5) Industry/Organization Updates

6) Key Presentation / Round Table Discussion

7) Next Working Group Meeting / Close

AGENDA

1) Orientation / Sign-In

2) Public Comments

3) Welcome / Opening Statement

4) Working Group Updates

5) Industry/Organization Updates

6) Key Presentation / Round Table Discussion

7) Next Working Group Meeting / Close

AGENDA

1) Orientation / Sign-In

2) Public Comments

3) Welcome / Opening Statement

4) Working Group Updates

5) Industry/Organization Updates

6) Key Presentation / Round Table Discussion

7) Next Working Group Meeting / Close

San Diego County

BUILDING

BETTER ROADS

Subcommittee Update

02/09/2021

GUIDANCE DOCUMENT DEVELOPMENT

Overview

- Subcommittees

1/ Reclaimed Asphalt Pavement (RAP)

2/ Mix Types

3/ Alternative Pavements

4/ Contracting

GUIDANCE DOCUMENT DEVELOPMENT

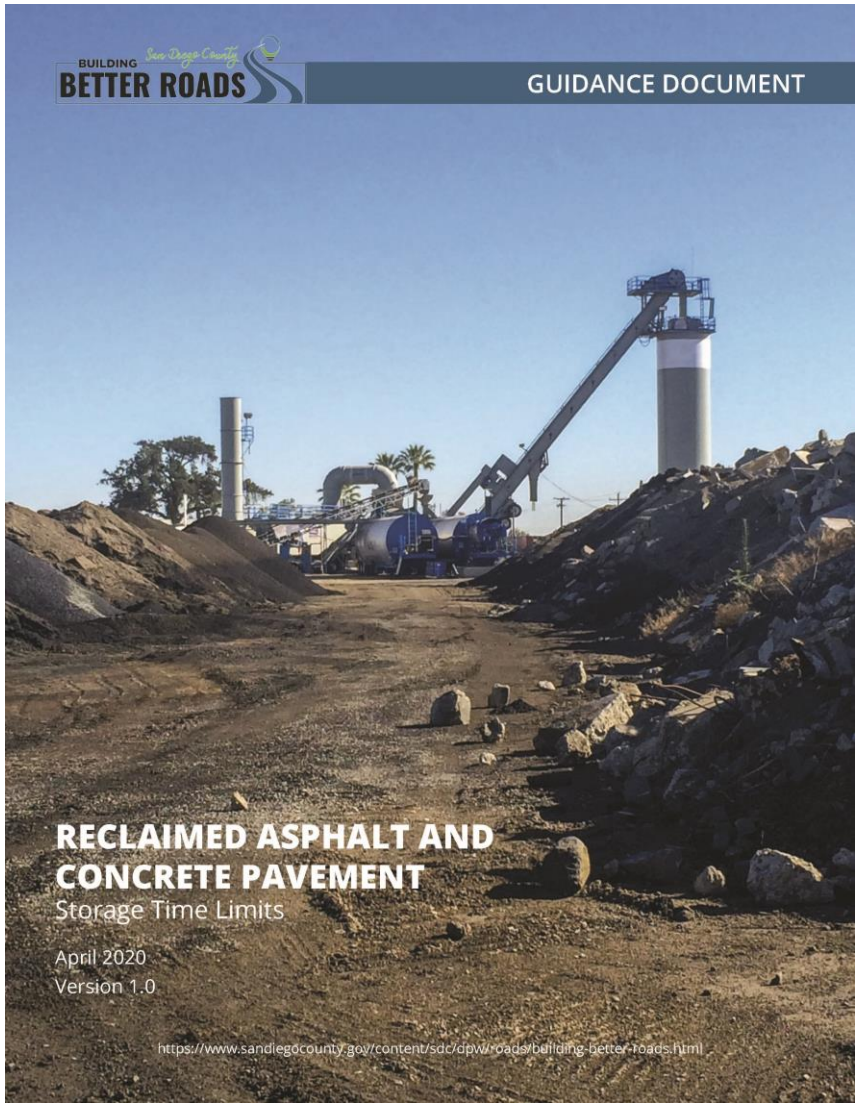
Overview

20 Guidance documents identified for development

11 Guidance documents under development

1 Guidance document complete

GUIDANCE DOCUMENT DEVELOPMENT



BUILDING BETTER ROADS San Diego County

RECLAIMED ASPHALT AND CONCRETE PAVEMENT | STORAGE TIME LIMITS

ABSTRACT

In this guidance document, we will detail an option to increase allowable storage times of Reclaimed Asphalt and Concrete Pavement for greater flexibility and reduced material waste.

Materials suppliers that process concrete and asphalt for reuse can only store this material for a total of 12 months after processing in accordance with California regulations. This guidance document identifies a process that may allow material suppliers to store processed concrete and asphalt for greater than 12 months with approval from the Local Enforcement Agency.

THE ISSUE

Material usage needs may not align with storage time limits.

The construction industry generates millions of tons of recycled concrete and asphalt annually. Recycling facilities are regulated by California's Department of Resources Recycling and Recovery (CalRecycle). Existing CalRecycle regulations require that material suppliers process concrete and asphalt within six months and store processed material no longer than 12 months in accordance with California Code of Regulations (CCR), Title 14, Section 17381.1(e). This regulation exempts materials suppliers that are classified as a 1) Type A inert debris recycling center that is located at an inert debris engineering fill operation, 2) inert debris Type A disposal Facility, or 3) a material production facility*. Compliance with this regulation is monitored in San Diego County by two Local Enforcement Agencies (LEA): The City of San Diego, within their respective city limits, and the County of San Diego, Department of Environmental Health for the remainder of the county. The maximum storage time of 12 months for processed concrete and asphalt often limits the amount of material that can be stored by material suppliers thus restricting their flexibility to respond to fluctuating market demands.

Key Issues:

- Demand for using recycled concrete or asphalt material may not occur within the mandated 12-month storage period
- Materials suppliers may limit the amount of materials stored, which could result in more recycled material ending up in landfills
- Limiting the amount of materials stored restricts the supplier's ability to respond to changes in market demands

* "Material Production Facility" means a facility that primarily handles raw materials to produce a new product that is a rock product operation (i.e., an "aggregate" operation), a hot mix asphalt plant, or a concrete, concrete product or a Portland cement product manufacturing facility. Title 14, CCR Section 17381(r)

PAGE 1

PAGE 2

PAGE 3

GUIDANCE DOCUMENT DEVELOPMENT

RAP

GUIDANCE DOCUMENT	STATUS
RAP Storage Time Limits	Complete
Use of RAP in Pavement Seals	Peer Review Complete. Subcommittee to address comments.
Use of RAP percentage in ACOs in excess of 15% (Greater than 15%, less than 25%)	Peer Review Complete. Subcommittee to address comments.

GUIDANCE DOCUMENT DEVELOPMENT

MIX TYPES

GUIDANCE DOCUMENT	STATUS
Evaluate need to require Fractionation for RAP mixes	Ready for Peer Review
Need to Standardize Specifications for the Region	Local Agency Survey conducted to determine current conditions

GUIDANCE DOCUMENT DEVELOPMENT

ALTERNATIVE PAVEMENTS

GUIDANCE DOCUMENT	STATUS
Full Depth Reclamation Of Existing Road Section	Seeking BBR members to review this document
Cold-in-Place Recycling	Seeking BBR members to review this document

GUIDANCE DOCUMENT DEVELOPMENT

CONTRACTING

GUIDANCE DOCUMENT	STATUS
Delayed/Flex Start to Contracts	Preparing second draft for distribution to subcommittee

Website Upgrades

- Increased Functionality and Content
- Minutes, Presentations, Trainings
- Guidance Documents
- Upcoming Activities
- Subscribe for E-mail Updates!

San Diego County

BUILDING BETTER ROADS

Questions?

AGENDA

1) Orientation / Sign-In

2) Public Comments

3) Welcome / Opening Statement

4) Working Group Updates

5) Industry/Organization Updates

6) Key Presentation / Round Table Discussion

7) Next Working Group Meeting / Close

MIKE MCMANUS - AGC

ASSOCIATED GENERAL CONTRACTORS OF AMERICA, SAN DIEGO CHAPTER INCORPORATED
6212 FERRIS SQUARE, SAN DIEGO, CA 92121

"THE VOICE OF CONSTRUCTION"

AGC San Diego Industry Update

Mike McManus - AGC

Nationwide

December COVID relief bill nets $10 Billion for State DOTs

- Funding for highways/bridges/transit/ports

Expectations for 2021 (nationwide survey 1300 contractors)

- Only 35% plan to add staff

Protecting the Right to Work (PRO) Act

- Legislation has been re-introduced to change labor law

Construction prices are on the rise during the pandemic

- Productivity is down as contractors take steps to protect workers/community

Mike McManus - AGC

California

State Water Board starts process of re-issuing the Storm Water Construction General Permit

- Stakeholder presentations of preliminary draft are on-going

AB 5

- Trucking injunction appealed to Ninth Circuit

Cal-OSHA now citing employees for COVID-19 violations

- Starting Feb 1, Cal-OSHA is enforcing the new ETS and citing employees

Mike McManus - AGC

Locally

Tax Measures or fee increases on the horizon – We support funding of infrastructure projects

- SANDAG 2022

Strong demand for construction services in this region

- Infrastructure projects keep on coming

Brandon Milar- CalAPA

- The California Asphalt Pavement Association

Asphalt Industry Update

Brandon Milar

- Happy National Pizza Day!!!
- CP2 announces Pavement Preservation Academy Certificate Program
- CalAPA Round-Robin / Proficiency Sample Update – RHMA-G and Hveem Stability
- Caltrans Identifying Projects for High RAP and RAP & RAS field mix evaluations
- Plastics in HMA Webinar on March 3rd

BRANDON MILAR

Contact Information

Brandon Milar, P.E.
Director of Technical Services
California Asphalt Pavement Association (CalAPA)
916-791-5044
bmilar@calapa.net
www.calapa.net

AGENDA

1) Orientation / Sign-In

2) Public Comments

3) Welcome / Opening Statement

4) Working Group Updates

5) Industry/Organization Updates

6) Key Presentation / Round Table Discussion

7) Next Working Group Meeting / Close

Building Sustainable Pavements

Using Reinforcement to Construct Stronger & More Cost-Effective Asphalt Surfaces

Alex Kotrotsios, P.E.
Project Manager

PACIFIC
GEOSOURCE

1

AGENDA

Fiber Reinforced Asphalt (FRAC)

- What Is Aramid Fiber? / How Does it Work?
- Implementation
- Benefits

FRAC Project Examples

- Value Engineered Examples

Questions

2

Participants

Joining us today for the round table discussion;

- Joe Yaede – Pacific Geosource - Lead Pavement Engineer
- Roger Schlierkamp – GMU Geotechnical – Director of Pavement Engineering
- Shaun Pelletier – City of Aliso Viejo – Director of Public Works
- James Wagner – City of Huntington Beach – Sr. Civil Engineer (Retired)

3

Asphalt Can't Do That, Right?

4

Today's Infrastructure Challenges

- Ever-increasing traffic loads
- Aging road & highway systems
- Limited budgets mean owners cannot keep up with maintenance
- Aggregate resources are not infinite – rising material costs

5

6

Types of FRAC

2 Kind of Aramid Fibers on the Market

- FORTA-FI

- ACE XP

7

Critical Factors for Complete Aramid Fiber Reinforcement

Aramid Strength

Dispersion & Distribution

Micro-Fibrillation

8

Aramid Dispersion

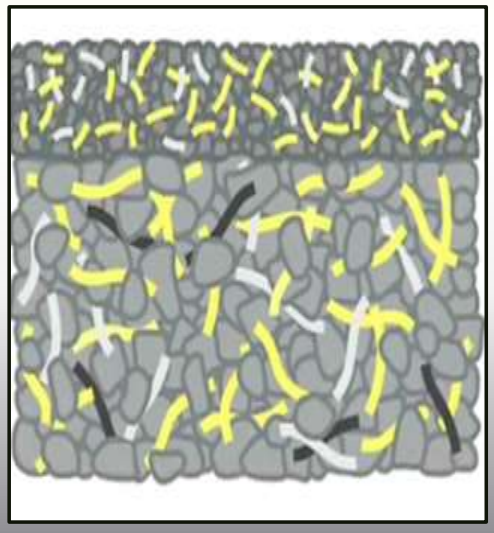
9

3-D Reinforcement

Rutting Resistance

Cracking Resistance
- Thermal
- Top-down
- Reflective
- Bottom-up

Enhanced Fatigue Life



1 lb/ton = 19 Million
Individualized, Dispersed, and Micro-Fibrillated Aramid Fibers

10

Any Plant
Any Mix

11

Profile / Curb and Gutter Restrictions

Increased Traffic Volume, Heavy Loading

Steep Slopes, Reflective Cracking

Environmental / Thermal Cracking

Any Situation

- High Tensile Strength
- Increased Fracture Energy
- Increased Fatigue Life
- Superior Compaction

12

Construction: Placement & Rolling

13

Construction: Raking

14

FRAC Use - Worldwide

- **Used in all 50 states**
- **Used by 44 of 50 State DOT's**

15

FRAC Use – California Agencies

California Cities:

- Sacramento
- Santa Rosa
- Ukiah
- Pomona
- Costa Mesa
- Irvine
- Huntington Beach
- Fountain Valley
- Carlsbad
- Laguna Niguel
- Santa Clarita
- Aliso Viejo
- Lake Forest
- Westlake Village
- Agoura Hills
- Ridgecrest
- San Juan Capistrano
- Mission Viejo
- Escondido
- Colton
- Jurupa Valley
- Monrovia
- Anaheim
- Garden Grove
- San Diego

California Counties:

- Los Angeles County
- Ventura County
- San Diego County
- Stanislaus County
- Riverside County

Ports:

- Port of Los Angeles
- Port of Long Beach

16

Other Notable Users

Walmart

National Center for Asphalt Technology NCAT at AUBURN UNIVERSITY

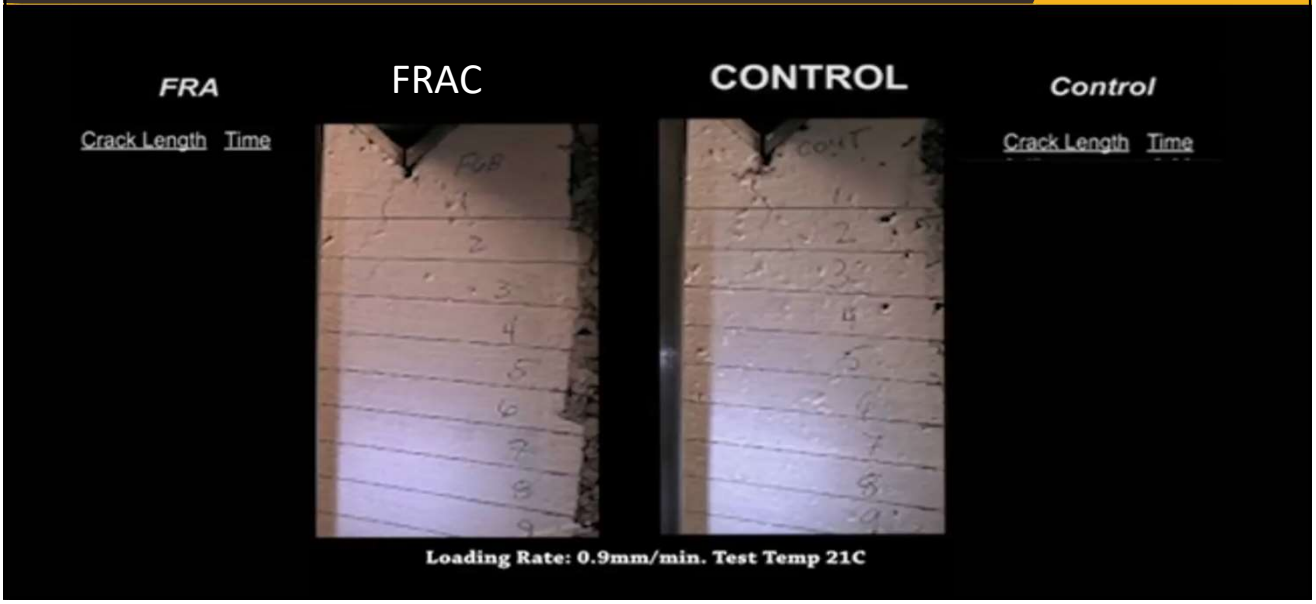
COSTCO WHOLESALE

FHWA

THE IRVINE COMPANY

17

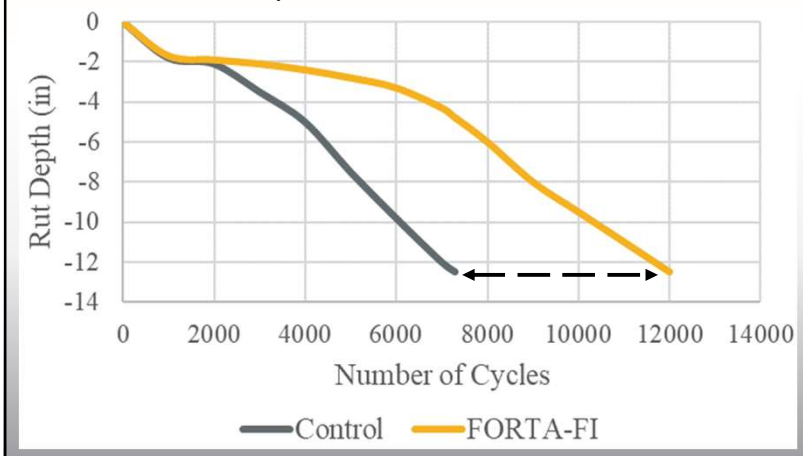
Lab Testing – Crack Propagation



18

Rutting Resistance – Hamburg Wheel Tracking

FRAC: 71% Improvement



Results from University of Texas Austin

Notable Testing Locations

U.S. Department of Transportation Federal Highway Administration

Pennsylvania Department of Transportation (PENNDOT)

Penn State

TEXAS The University of Texas at Austin

Texas Department of Transportation

ADOT

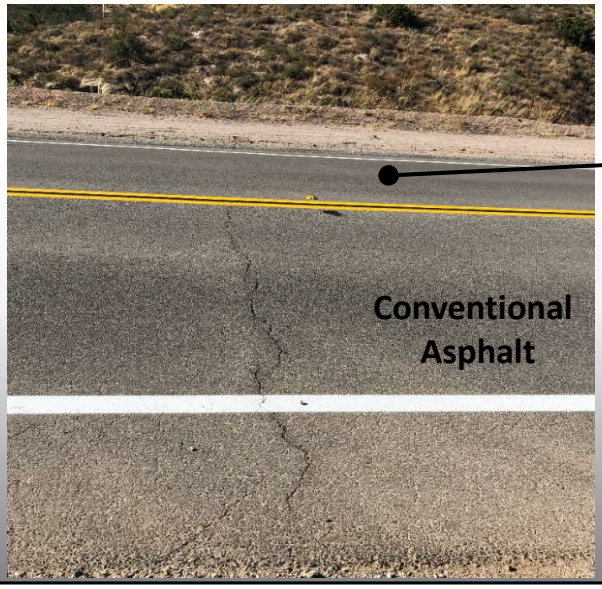
19

Cost/Benefit & Project Examples

20

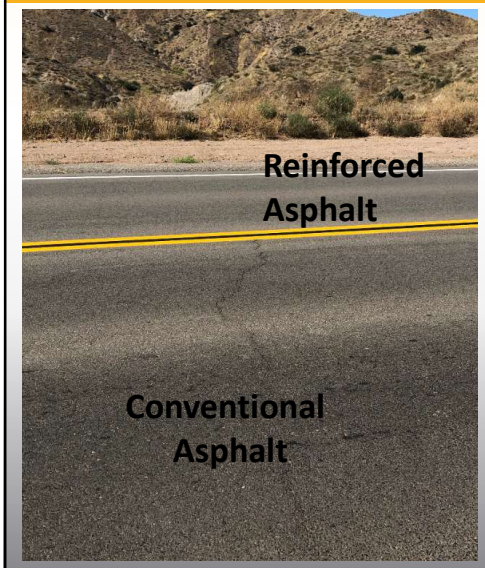
Davenport Road: Aramid Reinforced

- Los Angeles County District 5 Trial Project
- 2” C2-PG-70-10 Overlay
- North Side – Aramid
- South Side – No Aramid
- Constructed November 2017
- Dozens of traverse cracks witnessed ending at the CL butting up to the reinforced side.



21

Davenport Road: Aramid Reinforced



22

Davenport Road: Aramid Reinforced

Table 2 shows the amount (measured in Linear Feet) and Severity (Low, Medium, High) of Longitudinal & Transverse cracking that were found at each sample location, per lane.

Inspection Number	Distress	Severity	Control EB (LF)	FRAC WB (LF)
1	Long. & Trans. Cracking	Low	57	38
2	Long. & Trans. Cracking	Low	25	13
3	Long. & Trans. Cracking	Low	157	39
4	Long. & Trans. Cracking	Low	17	21
5	Long. & Trans. Cracking	Low	89	8
6	Long. & Trans. Cracking	N/A	0	0
7	Long. & Trans. Cracking	N/A	0	0
8	Long. & Trans. Cracking	Low	24	5
9	Long. & Trans. Cracking	Low	15	
10	Long. & Trans. Cracking	Low	39	
11	Long. & Trans. Cracking	Low	111	17
			Σ = 534 LF	Σ = 141 LF

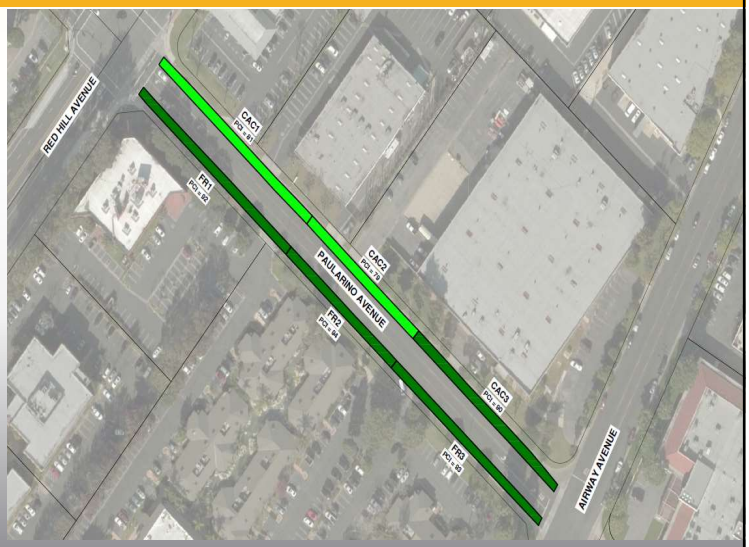
Table 2

74% Less Cracking in the Reinforced West Bound Lane

23

Costa Mesa: Paularino Avenue 2014

- Repaved in 2014
- Full Reconstruct of road
  - FR: 8” AC Base w/FRAC
  - FR: 2” Rubberized Cap
  - CAC: 8” AC Base
  - CAC: 2” Rubberized Cap
- 2018 and 2020 PCI surveys



24

Paularino Avenue PCI 2018 & 2020

Table 1: PCI Results

Mix Type	Sample Unit ID	Sample Unit PCI 2018	Sample Unit PCI 2020	Area-Weighted PCI 2018	Area-Weighted PCI 2020
Conventional AC	"CAC1"	81	68	84	68
	"CAC2"	79	65		
	"CAC3"	90	70		
Fiber-reinforced AC	"FR1"	92	75	93	77
	"FR2"	94	80		
	"FR3"	93	77		

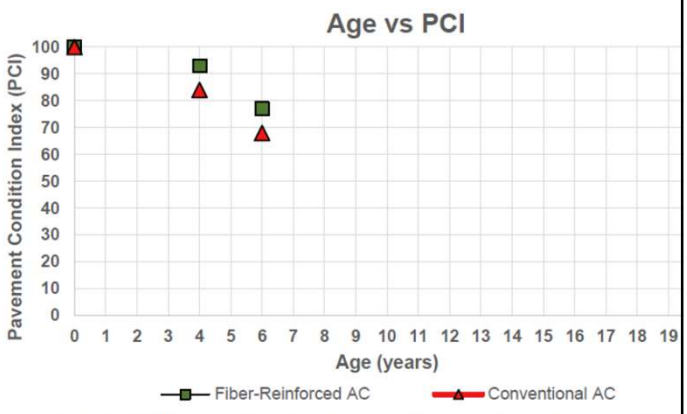
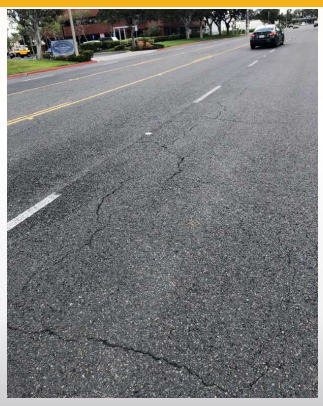


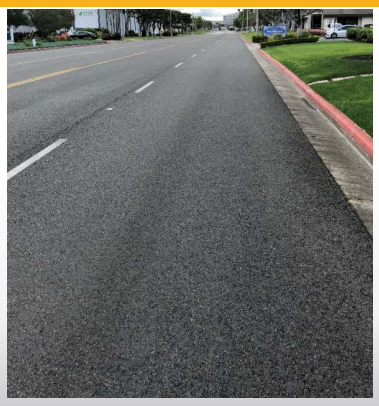
Figure 1: PCI for conventional and fiber-reinforced AC over tim

25

Paularino Avenue: 2020 Update



Control (CAC)



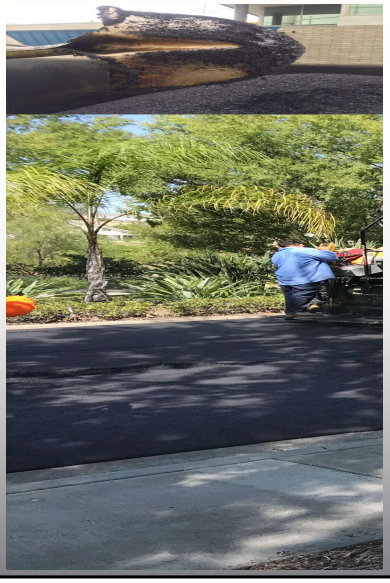
Reinforced (FR)

- Total Crack Lengths
  - FR: 821 LF
  - CAC: 2510 LF
  - 67% Less Cracking on Reinforced Side

26

Other Projects

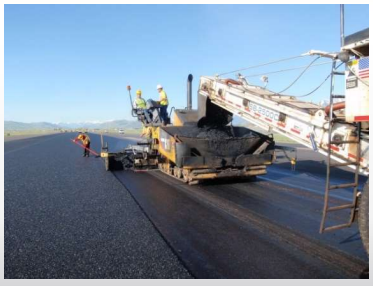
- Bid out as an option, allows **flexibility**
- Popular upgrade with **private communities**
  - Irvine Company
  - Private HOAs
    - Crystal Cove, Newport Coast Master, Pelican Hill, Emerald Bay, Ocean Ranch
- **Agencies**
  - Aliso Viejo
  - Mission Viejo



27

Jackson Hole Airport, WY (2009)

- 1.5" Open-Graded Friction Course (OGFC)
- Reinforced with Aramid fibers



- 10 years later, pavement still looks great →

28

Jackson Hole Airport, WY (2009)

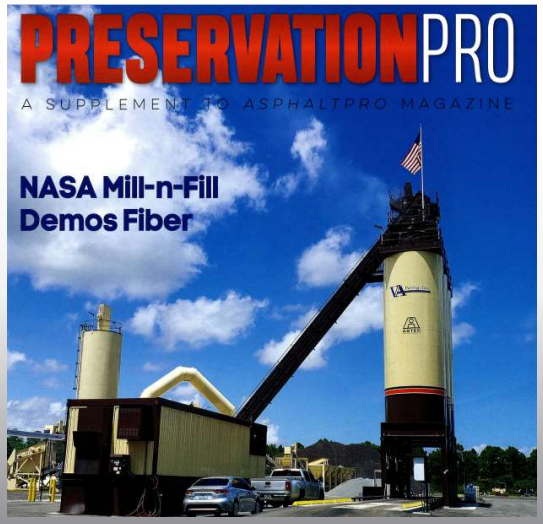
Unique challenges:

- Extreme dynamic loading on runway at 7000’ elevation
- Raveling in OGFC pavement due to snow plowing
- High thermal stresses due to large temp swings
- 7 years old when overlay was required



29

NASA: Reinforced Asphalt



- 2” Grind & Overlay w/FRAC
- 1 Mile Strip with a Control Vs. Fiber on Kennedy Parkway
- Constructed in June 2019

30

NASA: Fiber Reinforced Asphalt

31

Boeing Facility, Mesa, AZ

2009

2016: 7 Years of Service, 0 Cracks

32

Boeing After 10 Years

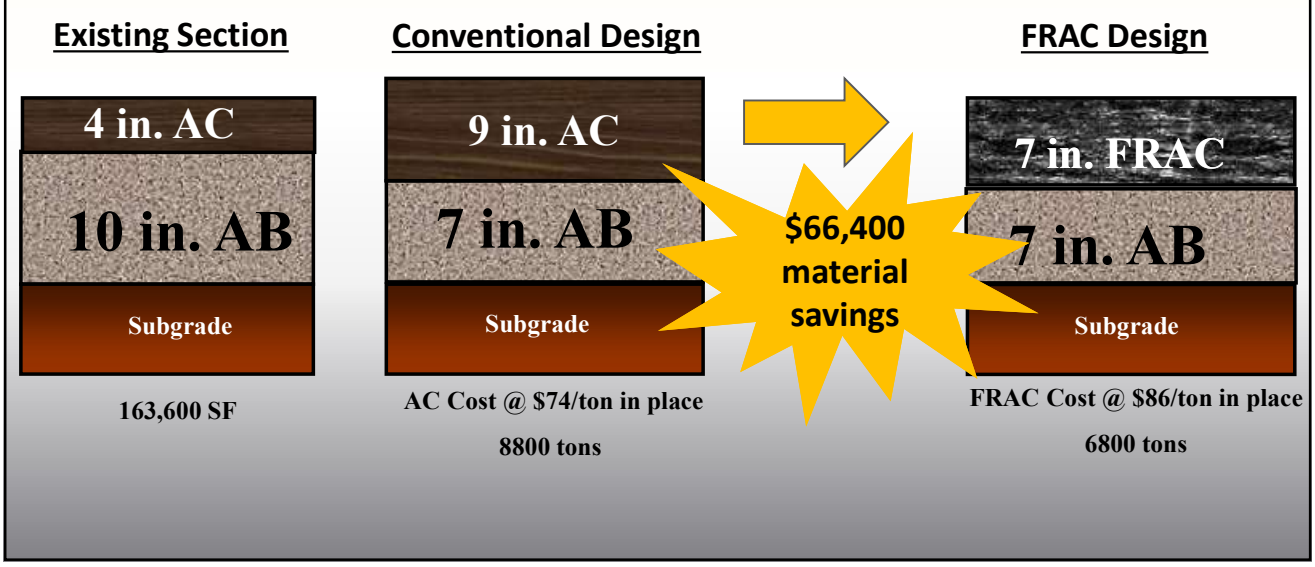
33

Value Engineered: Argosy Road (Huntington Beach)

- Industrial area, heavy truck traffic
- Traffic increase required thicker AC layer
- FRAC used to avoid raising the crown of the street

34

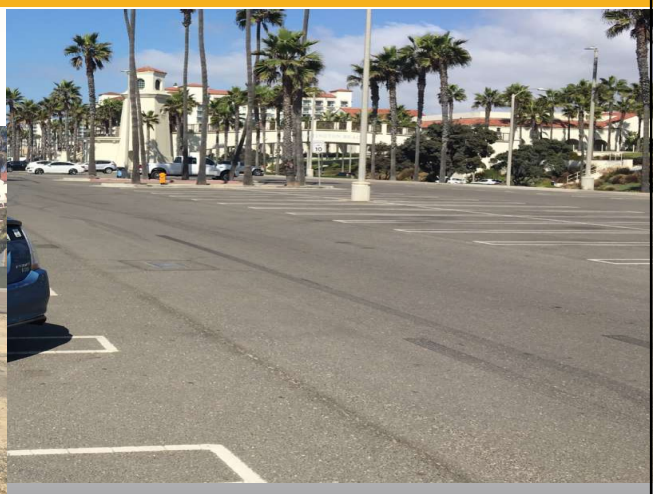
Value Engineered: Argosy Road (Huntington Beach)



35

Huntington Beach FRAC Use

November 2014

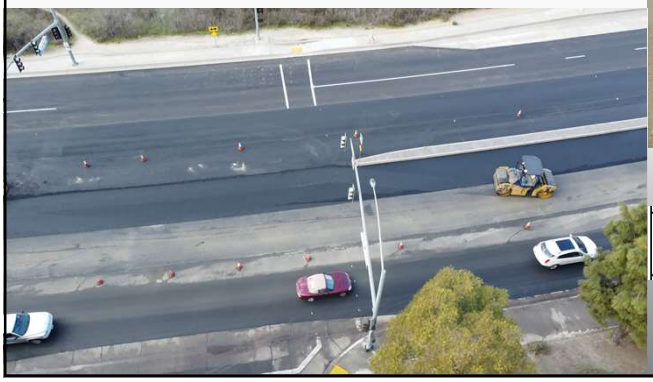


October 2018

36

City of Aliso Viejo FRAC Use

- City has used FRAC for the last 4 years
- Utilized to extend the lifetime of AC overlays
- Have been using FRAC as additional insurance to help mitigate reflective cracking



3	2" Asphalt Concrete (C2-PG 64-16) with Fibers	TON	2,400

37

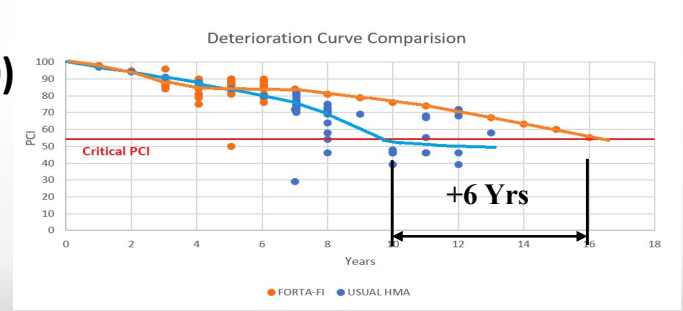
Pine Township: Network Evaluation

93 Streets Evaluated:

42 - Conventional (2007-2010)

51 - FRAC (2011-2016)

3 - Side-by-side Comparisons



63% Less Load Related Distress

Alligator Cracking, Edge Cracking, Reflective Cracking

50% Less Temperature & Weather-Related Distress

Block Cracking, Weathering

ADVANCED MATERIALS

TOWNSHIP OF P·I·N·E

38

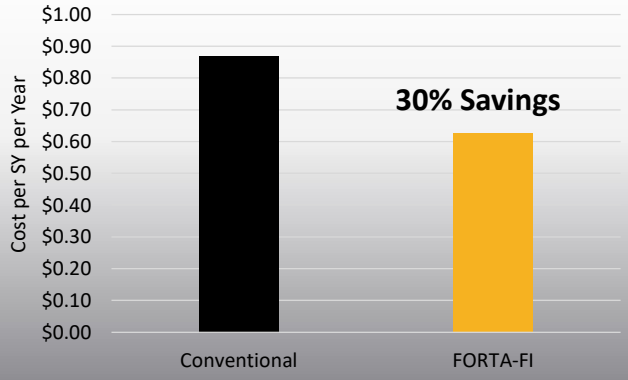
Pine Township: Network Evaluation

Life Cycle Cost Analysis

HMA 10-yrs to Resurfacing
FRAC 16-yrs to Resurfacing (based on Pine Township Data Analysis)

Costs: HMA: $80/ton, FRAC $92/ton
Overlay Thickness = 2" (1 ton ≈ 9.2 SY)

Savings $0.25 per SY per Year



39

Asphalt Can't Do That, Right?

40

PACIFIC GEOSOURCE
Road-Tested Pavement Solutions

Questions?

- Any Project
- Any Mix
- Questions?

Alex Kotrotsios, PE
949-610-2627
alex@pacificgeosource.com

41

AGENDA

1) Orientation / Sign-In

2) Public Comments

3) Welcome / Opening Statement

4) Working Group Updates

5) Industry/Organization Updates

6) Key Presentation / Round Table Discussion

7) Next Working Group Meeting / Close

San Diego County

BUILDING BETTER ROADS

MEETING ADJOURNED

THANK YOU FOR ATTENDING!